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## COMMENTARY

### Smoke alarms and prevention of house-fire–related deaths and injuries

Smoke alarms have saved thousands of lives in the United States since their introduction and widespread use during the past 2 decades. The good news is that more than 90% of homes in the United States now have at least 1 smoke alarm.<sup>1</sup> The bad news is that a substantial proportion of those smoke alarms do not work. In on-site surveys of homes with smoke alarms, about 25% to 30% of the alarms did not function when tested.<sup>2</sup> Some failures are due to malfunction of the alarm itself, some are due to a dead battery, and some do not function because the bat-

tery has been removed.<sup>2,3</sup> The study by Fazzini and colleagues is particularly relevant for the last group.

The authors compared the rate of false alarms (or “nuisance alarms”) between ionization-type and photoelectric-type smoke alarms that had been installed in low-income homes in 4 small villages in Alaska. Six months after installation, more than 90% of the homes with ionization-type alarms had experienced false alarms, mostly from cooking, and 19% had been disconnected, presumably because of the nuisance alarms. The comparison group

with photoelectric alarms had low rates of nuisance alarms (11%) and battery removal (4%). Whereas these differences are statistically significant and important, the data should be interpreted with caution because of the unique nature of the population studied. The rates of nuisance alarms and battery removal found in Alaska are severalfold higher than previously seen<sup>4</sup> and may be due to several unusual characteristics of this population in Alaska and the methods used in the study.

The homes in the study were small, averaging less than 1,000 sq ft of living space. As a result, the distance between the kitchen and the alarm was short, a factor known to increase the chance of a nuisance alarm from cooking.<sup>5,6</sup> In addition, most of the nuisance alarms were due to frying, which results in more smoke than other forms of cooking. If the practice of frying food was more prevalent in the villages with ionization-type alarms, this could have accounted for much of the difference between the 2 groups, with the difference being magnified by the proximity of the alarm to the kitchen. In addition, differences in the presence of effective exhaust fans may have influenced the rate of false alarms.

Another unusual finding from the study is the high proportion of the homes in which the alarm battery had been removed, even though the incidence of nuisance alarms appears to have been an average of only slightly more than 1 per home (69 nuisance alarms in 54 homes, with at least 1 nuisance alarm). The authors report that the alarms had silence buttons that disable the alarm for 10 minutes, allowing the smoke to be cleared; yet, the batteries were removed. This raises the question of whether the people in the homes with these alarms knew how to silence them. In our experience, some alarms are difficult to silence without specific knowledge of where to press on them and how long to press to silence them. Perhaps better instruction about the method of silencing the alarm would decrease the chance of battery removal for nuisance alarms in this setting.

These issues are important because photoelectric alarms cost almost twice what ionization alarms cost, so only half as many homes can be protected within a given budget. The findings of Fazzini and colleagues need to be confirmed and replicated in other populations to weigh the relative costs and benefits of ionization against photoelectric alarms.

Smoke alarms will probably continue for the foreseeable future to be one of the most important means of preventing fire-related deaths. Homes at highest risk of fire and fire-related deaths and injuries are those least likely to have smoke alarms—that is, homes in the lowest socioeconomic neighborhoods and those of substandard quality.<sup>7,8</sup> Identifying those homes and ensuring that they have smoke alarms installed are challenging public health issues. Systematic use of surveillance data to identify

deaths and injuries due to house fires is essential to focus resources into neighborhoods at greatest risk and where the greatest benefit may be inured. Once identified, these areas can be the target of efforts to increase the prevalence of smoke alarms, such as through mass smoke alarm distributions.<sup>4,9–11</sup>

The opportunity exists to mobilize our collective efforts with the goal of eliminating deaths related to house fires in the United States. A multifaceted approach to elimination should include the distribution of smoke alarms, education about fire prevention, legislation to require smoke alarms in all existing residences and fire sprinkler installation where possible, enforcement of existing codes, and development of new and better long-lived smoke alarms. Such an approach can take us well along the road to eliminating deaths related to house fires.

Primary care physicians can play an important role in this preventive effort in at least 2 ways.<sup>12</sup> First, physicians can educate patients about the importance of fire prevention, escape plans, and smoke alarms, including issues about nuisance alarms and how to deal with them. Second, physicians can advocate for a community-based approach to try to reach those persons at greatest risk through programs such as smoke alarm distributions. Through a collaborative approach among physicians, public health agencies, fire departments, private industry, and volunteer groups such as the Red Cross, house-fire-related deaths may one day become as rare as some vaccine-preventable diseases.

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